TMF

April 1990

THE MAC FLYER - For Greater Safety in MAC Air Operations

The eyes of MAC in Europe . . . page 16

TMF

THE MAC FLYER—For Greater Safety in MAC Air Operations

April 1990 MACSP 127-5 VOL XXXVII NO. 4

page 20

page 24

FEATURES

3 Crumblings
Various causes for mishaps.

8 *TMF* Instrument Quiz

14 Official *TMF* Thunderstorm Quiz
How much don't you know?

16 435th Tactical Airlift Wing
The eyes of MAC in Europe.

20 Human Sense
Advice from the past.

24 C.R. TERROR
Fastest sled on earth.

27 Say Again . . .
Part two.

DEPARTMENTS

6 Flying-Hour Milestones
11 Mishap With A Moral
29 Quickstoppers
31 After Deadlines

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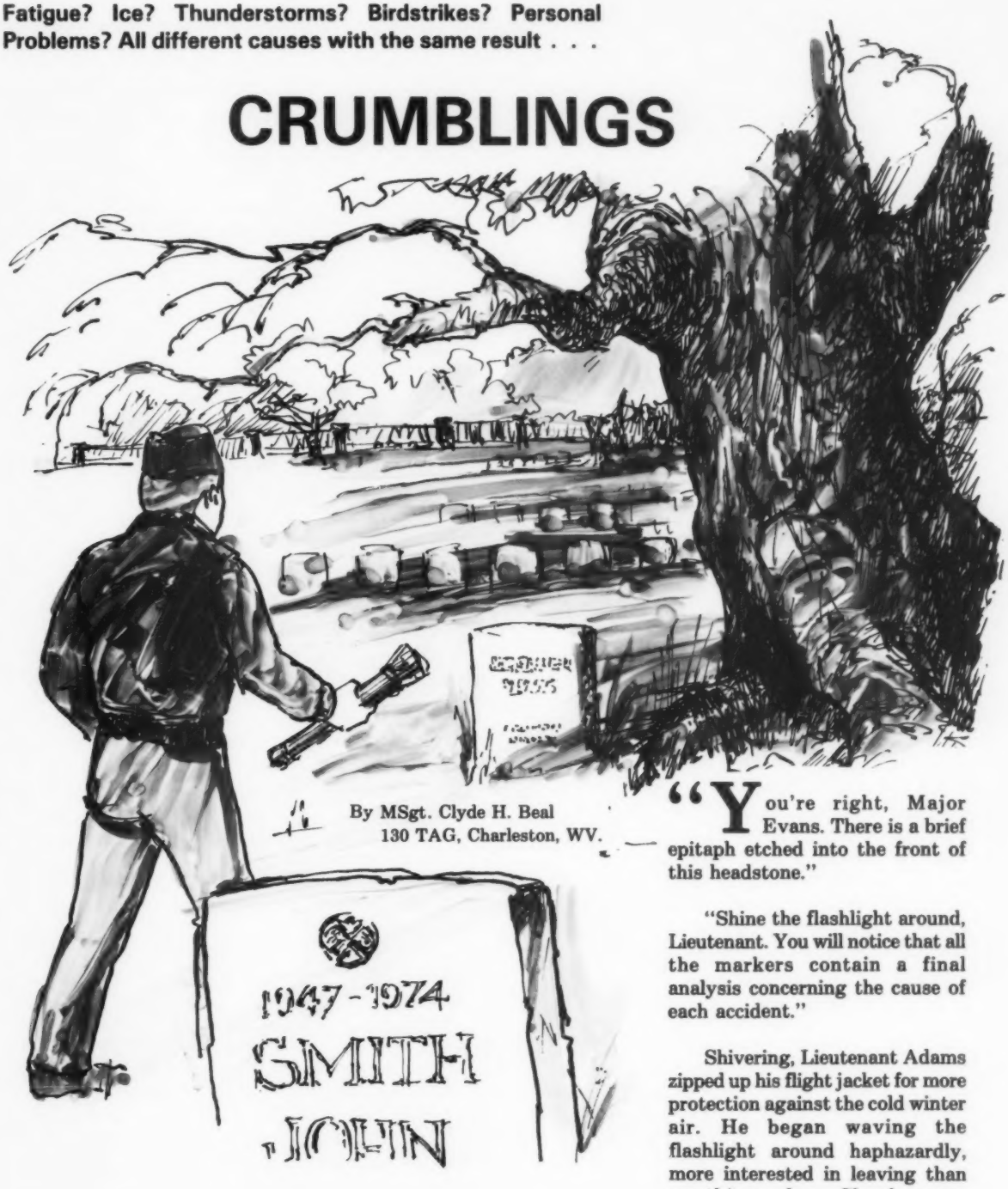
Fatigue? Ice? Thunderstorms? Birdstrikes? Personal Problems? All different causes with the same result . . .

CRUMBLINGS



By MSgt. Clyde H. Beal
130 TAG, Charleston, WV.

"You're right, Major Evans. There is a brief epitaph etched into the front of this headstone."

"Shine the flashlight around, Lieutenant. You will notice that all the markers contain a final analysis concerning the cause of each accident."

Shivering, Lieutenant Adams zipped up his flight jacket for more protection against the cold winter air. He began waving the flashlight around haphazardly, more interested in leaving than anything else. Cloud cover

1989 MAC Flight Safety Writing Contest Honorable Mention

disappeared, momentarily letting the full moon project dark shadows over the weathered rows of carved stone. His vivid imagination saw trees with long waving arms reaching out toward him with every breeze. Green glowing eyes kept taking turns sneaking glances from behind each marker, and the major, who appeared to know everything about him, was a complete stranger.

"But I really don't understand what all this has to do with me, Major."

"Take a look at this marker over here, Lieutenant. INCORRECT PROCEDURES – 1955. That should remind you of your last checkride."

"I suppose I may have made a couple small mistakes during that particular evaluation— no big problem. It was only one flight, not my entire career. Any other time, I wouldn't have made those errors. Besides, I had a very good reason for my substandard performance on the checkride."

"No Adams, what you had was an *EXCUSE*, not a reason. Direct your flashlight beam underneath that old dead Sycamore Tree. Do you see the marker labeled COMPLACENCY—1958?"

"Not yet, Sir."

"Keep looking, Adams, it's there. It reminds me of your missed altimeter check during descent a few months back. You overlooked it as though the words were missing from the pages of your checklist."

"I remember. I've landed at that particular base for the past 18 months. The terrain is absolutely flat and the altimeter setting is not critical. I can't locate the headstone you're talking about. Are you sure it's here?"

"Perhaps it's not there yet. Maybe I got the date confused; there are so many new ones. Walk over here. Careful, work crews have been doing some fresh digging, they're getting ready for tomorrow's accident. . . If only it would stop."

"How do you know . . . ?"

"There it is, FATIGUE—1961. I suppose the poor soul is quite 'rested' by now. Ever been guilty of that one, Adams?"

"Sir, if you're talking about proper crew rest, younger people can handle getting by with less sleep. Staying out late the night before a mission, at my age, isn't a real problem; besides, doesn't everyone do it?"

As though it came from nowhere, the flapping wings of a low flying barn owl caused cold sweat to surface on the lieutenant's forehead.

"You look frightened, Adams. Are you?"

"That was much too close for me, Sir."

"Sorta brings back memories of this headstone right here. MIDAIR—1964. That crew should see the skies today."

"Well, at least I'm not guilty of this one."

"Maybe so, Adams, but you could have been. Improper crew rest, complacency, and lack of team coordination, all have the

correct ingredients for your very own midair. To be quite honest, your ability was never the problem.

"Look at this one, SURFACE ICE—1968. What's your reaction?"

"Well, Sir, you certainly can't credit me with casualties related to snow and ice accumulation."

"Credit, indeed, Lieutenant Adams. NO ONE EVER wants to claim credit for the results of human mistakes! I'm going to turn in a work order tomorrow for a proper entrance sign for this place. It will read "HERE LIES THE RESULTS OF UNEARNED CREDIT—THE FACTS ARE STRANGER THAN FICTION!"

"Well, Sir, no matter how you feel about my flying ability, I believe that as a crewmember, I do my part and probably more."

"And the sad part of it is, it's much too late for me to try to change your attitude now.

"Shine the flashlight toward the caretaker's cottage, Adams. Just to the right of that rusty gate. See it? SEVERE THUNDERSTORMS—1971. What are your feelings concerning this one?"

"I'm not too sure. I've heard talk but never experienced a real bad storm."

"It's too bad this crew acted as they did. Perhaps a complete discussion of their alternatives could have increased their safety record. Effective communication, Lieutenant, is a very underrated process."

"Everything you've told me tonight I've heard before. Accidents happen all the time; if you fly, that's the chance you take. I'm bored, I'm very tired, and it's freezing. I would like to leave now if you would just show me the way out of here."

"You will be home very soon, Lieutenant Adams, I PROMISE! Look over there, right next to the large moss-covered headstone marked BIRDSTRIKE—1975. See it? PERSONAL PROBLEMS—1979."

"Sure, I see it, but everyone has problems once in a while."

"That's true. But when they impair your concentration in flight—that's when personal problems have tragic potential. Just last month you were asked twice to respond during a descent check. Weren't you preoccupied with your leave request being turned down?"

"How could you know about that?"

"It's not important how I knew, Adams, only that you were not giving one hundred percent—just like those beneath that marker. Shine your flashlight along the next wall. I wasn't going to mention this one but your orientation would not be complete without it. Right there, UNAUTHORIZERD MANEUVERS—1986. If there ever was a marker that has no place here, this is the one. Performing reckless, chance-taking maneuvers is most definitely not characteristic of a professional attitude in the cockpit. It's very hard to understand how crew discipline could become so lax as to allow this to happen.

"Follow me. There's one more place you need to see, but be careful, these steps are always slick this time of the year."

"Where are you taking me now, Sir?"

"This place is called the Safety Room. It's our newest underground location where space is reserved for a select few, like this new occupant right here, INDIFFERENCE— 1989. Aren't those roses pretty? I picked them myself this morning. This individual also rationalized every mistake he made as always acceptable."

"Okay, Major, but what does all this have to do with me? I've got a mission in the morning and right now all I want to do is go home . . . ."

"But, Lieutenant Adams, this is your NEW home!"

"NO!!! I DON'T LIKE IT HERE. . . IT'S SO VERY COLD . . . I WANT TO LEAVE NOW!"

The hallway clock above the VOQ sign displayed 0219 hours as several crewmembers stood outside the door listening to the nightmarish echoes coming from Lieutenant Adams' quarters.

MSgt. Beal, a C-119, C-47, and C-54 flight engineer, enlisted in the Air Force in 1959. With the West Virginia Air National Guard since 1969, Sergeant Beal is currently a Training Technician.

Flying-Hour Milestones

15,000

728 MAS
CMSgt. John C. O'Donnell

10,000

913 TAG
Lt. Col. Allen I. Cohen

7,500

HQ MAC/DOT
CMSgt. Arthur West

728 MAS
Col. Dennis W. Thompson
Lt. Col. Jack W. Linet
Lt. Col. Vern D. Mabry
Maj. Raymond B. Garrison
SMSgt. Norman C. Swanson

5,000

1 MAS
Lt. Col. Thomas Butler
Lt. Col. James W. Chappelear, Jr.
Lt. Col. Gary L. Doyle
Lt. Col. Alexander Escarzaga
Lt. Col. John Fenn
Lt. Col. Danny R. Hutton
Lt. Col. James S. Kash
Lt. Col. Lawrence N. Lacey
Lt. Col. John W. Parrish, Jr.
Lt. Col. Terry D. Rohr
Lt. Col. Wayne A. Sharkey
Lt. Col. Thomas J. Thelen
Maj. Howard Campbell
Maj. Kenneth D. Moore
Maj. Darwin P. Prewitt
Maj. Stephen A. Strack
Maj. Coy E. Whitman, Jr.
Maj. Wayne E. Williams
Capt. Allen H. Hodges
SMSgt. Albert R. Kauses
SMSgt. George M. Leyendecker
MSgt. Russell L. Brooks
MSgt. Mark L. Buchner
MSgt. Thomas J. Collinson
MSgt. Glenn R. Hirt
MSgt. Curtis O. Izzard
MSgt. Thomas P. Mabry
MSgt. Michael W. Tedford
MSgt. Lee E. Swanson
TSgt. Steven L. Lominas

3 MAS
SMSgt. Robert H. Fox
SMSgt. Paul D. Mullins
TSgt. William H. Graham

9 MAS
CMSgt. Johnny D. Hodges

17 MAS
MSgt. James J. Marking, Jr.
MSgt. Conrad L. Erdmann

18 MAS
Lt. Col. Gary Coy
MSgt. Keith Colbath
MSgt. Michael R. LaMere
TSgt. Jepeth D. White
SSgt. Robert S. Viguers, III.
Sgt. Thaddeus R. Nitkiewicz

37 TAS
SSgt. David D. Franz

41 MAS
Lt. Col. Cari C. Hoge
TSgt. Edward C. Overstreet

41 TAS
Maj. William Willis

728 MAS
Lt. Col. Alan A. Ghizzoni
Lt. Col. Terrence M. Nelson
Maj. Robert R. Bologna
Maj. Jacob A. Gasper
MSgt. Donald G. Kochackis
MSgt. David N. Schluttenhofer
MSgt. Daniel P. Thompson
MSgt. Jno G. Visbal
TSgt. Randall L. Hoblit
SSgt. Bret L. Knight

2,500

18 MAS
MSgt. David Latham
SSgt. Leroy A. McKenzie

30 MAS
Maj. Joe E. Cuthrell
SSgt. Robert J. Huttie

73 AAS
Maj. James R. Long
TSgt. Charles M. Becket
SSgt. Jeffrey Carvish
SSgt. Merrill S. Reeves

146 TAW
Lt. Col. James Beitzel
Lt. Col. Ronald Boll
Lt. Col. Dennis Fendelander
Lt. Col. James Hanley
Maj. Henry Bellion
Maj. David Bennett
Maj. John Bernick
Maj. Kent Briggs
Maj. Douglas Broadhurst
Maj. Mark Brophy
Maj. Gregory Buchanan
Maj. James Buisson
Maj. Dennis Callahan
Maj. Stephen Cooper
Maj. Lloyd Crumrine
Maj. Ronald Cuscino
Maj. Melvin Dunn
Maj. Steven Friedricks
Maj. John Haynes
Maj. Norman Herrington
Maj. Gary Hewitt
Maj. David Jones
Maj. Eddie Jones
Maj. Gregory Kalnitzky
Maj. Patrick Keating
Maj. Edwin King
Maj. Manuel Kou
Maj. Robert Kramer
Maj. Craig McGarraugh
Maj. Randolph McManus
Maj. William Meyer
Maj. Dennis Moeder
Maj. Carl Piccotto
Maj. George Soto
Maj. Robert Thayer
Maj. Barry Weber
Maj. Robert Williamson
Maj. Michael Withem
Capt. Robert Baxter
Capt. Kris Chrisman
Capt. David Clemence

Capt. Lee Crowder
Capt. Richard Deritis
Capt. Randolph Elson
Capt. Ronald Flanders
Capt. Jose Franco
Capt. Randall Gault
Capt. Richard Gibson
Capt. Gerald Mansell
Capt. John Vileisis
Capt. William Wright
SMSgt. Dale McIntire
MSgt. Michael Carrell
MSgt. Albert Cortez
MSgt. Jack Crabtree
MSgt. Joseph Custodio
MSgt. Douglas Ellis
MSgt. Thomas O'Connell
MSgt. Bennie Roberts
MSgt. William Weber
MSgt. Norman Woodward
TSgt. Charles Dehart
TSgt. Stephen Duke
TSgt. Douglas Perry
TSgt. William Peters
TSgt. Randy Sawlsville
SSgt. Arthur Sanchez

167 TAG
TSgt. Timothy W. Blakenship

445 MAW
Capt. Randolph F. Dunham
Capt. Gregory R. Pynn
MSgt. John D. Haynes
TSgt. Sandra G. Bryant
TSgt. Martin F. Griffin

608 MAG
Capt. Julio C. Caicedo, Jr.
Capt. Harry L. Clemons
Capt. Walter A. Schmid
MSgt. William M. Robins
Sgt. John S. Gerhard

616 MAG
Lt. Col. John C. Sand
Maj. Kenneth M. Menzie
Capt. Martin S. Fass
Capt. Mark W. Gieringer
Capt. Kirk E. Johnson
Capt. Mark Juscius
Capt. Theodore J. Manolas
Capt. Mark S. Okyen
Capt. William A. Raines, III.
Capt. Jeffrey S. Spencer
TSgt. Robert Kowalenski
TSgt. Permal Naidu
TSgt. David J. Zukowski
SSgt. Bradly C. Bakken
SSgt. John C. Bremerman, Jr.
SSgt. James J. Halstead
SSgt. Mark A. Kirmer
SSgt. Barry A. Stone

728 MAS
Maj. Harold L. Mitchell
Capt. Clayton S. Bisnett
Capt. Walter M. Coffey
Capt. Stephen L. Hosterman
Capt. Allen R. Jones
Capt. William P. Surratt
Capt. Frank L. Wallace
TSgt. David K. Anderson
TSgt. Taddeus S. Byrda
TSgt. Michael J. Whyte

913 TAG
Maj. Donald E. Fletcher, Jr.
Maj. W. T. Stille, III.
Capt. Giordano B. McMullen
TSgt. Robert J. Nugent
TSgt. Christopher K. Herwig

928 TAG
Maj. Paul B. Dealy
Maj. John L. Downs
Maj. Daniel W. Handlin
Maj. Lawrence C. Hill
Maj. James A. Ingham
Maj. Howard J. Kotlicky
Maj. David A. Laubhan
Maj. Jeffrey D. Lowe
Maj. William R. McConnell
Maj. Michael J. McCormick
Maj. John G. McCune
Maj. Curtis C. Miller
Maj. Joseph Nabozny
Maj. Thomas J. Natoli
Maj. Guilford L. Parsons
Maj. Charles M. Schencke
Maj. Donald J. Swaninger
Maj. Lorenz G. Vetter
Maj. Wayne S. Ziskal
Maj. Joseph P. Zmuda
Capt. Thomas C. Bohan
Capt. John P. Case
Capt. Glenn D. Evans
Capt. Stanley A. Gibson
Capt. Greg R. Sveska
Capt. Charles N. Valle
Capt. Kim W. Vanderford
MSgt. Wayne R. Hagele
MSgt. Anthony F. Marino
MSgt. Lewis D. Oblander
TSgt. Michael J. Flores
TSgt. Wallace H. Long
TSgt. David O. Olsen

1275 TES
Lt. Col. Marvin A. Schott
MSgt. Larry E. Chapman
TSgt. Paul D. Carney
TSgt. David A. Fredricksen
TSgt. James W. McClain, Jr.

1400 MAS
Lt. Col. Thomas J. Przybylowicz, Jr.
Lt. Col. Richard A. Mallahan
Lt. Col. Eric B. House, II.
Capt. Joseph L. Helmer

Det 2, 1400 MAS
Capt. Andrea L. Kowalsky

1401 MAS
Capt. Joel B. Siegel

Det 1, 1401 MAS
Capt. Ralph P. Petersen

Det 3, 1401 MAS
Capt. Mark H. Bogosian
Capt. Glenn R. Dundas

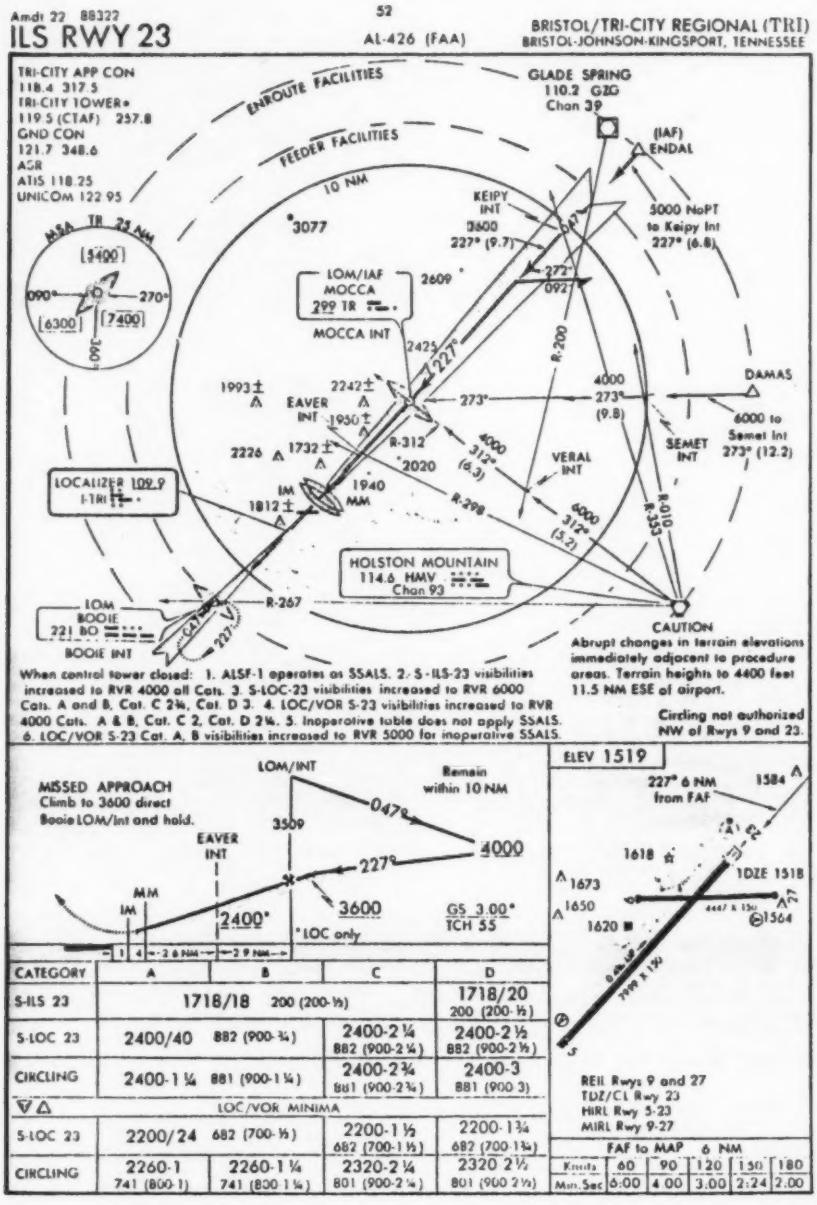
1402 MAS
Capt. Kirk A. Peterson

Det 1, 1402 MAS
Lt. Col. Walter F. Bryce, Jr.
Maj. James M. Latham
Maj. Gary L. Skol

1,000

ARS
Capt. John M. Bonomi
Capt. Jay D. Burdett
Capt. Martin T. Gimbus
Capt. West C. Kasper
Capt. Timothy J. Leahy
Capt. Richard K. Williams
1st Lt. Robert T. Bennett
1st Lt. Patrick A. Goodman
1st Lt. James W. Milroy
1st Lt. Darrin M. Valha
Sgt. George P. Levkulich

Ranks and units are those at time of award.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52
AL-426 (FAA)
BRISTOL/TRI-CITY REGIONAL (TRI)
BRISTOL-JOHNSON-KINGSPORT, TENNESSEE
TRI-CITY APP CON
118.4 317.3
TRI-CITY TOWER
119.5 (CTAF) 257.8
GND CON
121.7 348.6
AGR
ATIS 118.25
UNICOM 122.95
ENROUTE FACILITIES
FEEDER FACILITIES
GLADE SPRING
110.2 GZG
Chan 39
(IAF)
ENDAL
10 NM
KEIPY INT
3600
227° (9.7)
5000 NoPT
to Keipy Int
227° (6.8)
MSA TR 23 NM
[5400]
090°
270°
[6300]
[7400]
180°
3077
LOM/IAF
MOCCA
299 IR
MOCCA INT
2609
2425
227°
272°
092°
R-200
1993±
2242±
EAVER
INT
1930±
4000
273°
(9.8)
DAMAS
6000 to
Semet Int
273° (12.2)
SEMET
INT
2226
1732±
R-312
2020
4000
312°
(6.3)
VERAL
INT
LOCALIZER 109.9
I-TRI
IM
1812±
1940
MM
R-298
4000
312°
(5.2)
R-010
R-353
HOLSTON MOUNTAIN
114.6 HMV
Chan 93
LOM
BOOIE
221 BO
R-267
227°
BOOIE INT
CAUTION
Abrupt changes in terrain elevations immediately adjacent to procedure areas. Terrain heights to 4400 feet 11.5 NM ESE of airport.
Circling not authorized NW of Rwys 9 and 23.
When control tower closed: 1. ALSF-1 operates as SSALS. 2. S-ILS-23 visibilities increased to RVR 4000 all Cats. 3. S-LOC-23 visibilities increased to RVR 6000 Cats. A and B, Cat. C 2¾, Cat. D 3. 4. LOC/VOR S-23 visibilities increased to RVR 4000 Cats. A & B, Cat. C 2, Cat. D 2¼. 5. Inoperative table does not apply SSALS. 6. LOC/VOR S-23 Cat. A, B visibilities increased to RVR 5000 for inoperative SSALS.
MISSED APPROACH
Climb to 3600 direct
Booie LOM/int and hold.
LOM/INT
Remain
within 10 NM
047°
3509
4000
EAVER
INT
227°
MM
IM
2400'
3600
GS 3.00°
TCH 55
°LOC only
1
4
2.6 NM
2.9 NM
ELEV 1519
227° 6 NM
from FAF
1584
1618
1673
1650
1620
1364
TDZE 1518
4447 X 150
7999 X 150
REIL Rwys 9 and 27
TDZ/CL Rwy 23
HIRL Rwy 5-23
MIRL Rwy 9-27
CATEGORY
A
B
C
D
S-ILS 23
1718/18 200 (200-½)
1718/20
200 (200-½)
S-LOC 23
2400/40 882 (900-¾)
2400-2¼
882 (900-2¼)
2400-2½
882 (900-2½)
CIRCLING
2400-1¼ 881 (900-1¼)
2400-2¾
881 (900-2¾)
2400-3
881 (900-3)
LOC/VOR MINIMA
S-LOC 23
2200/24 682 (700-½)
2200-1½
682 (700-1½)
2200-1¾
682 (700-1¾)
CIRCLING
2260-1
741 (800-1)
2260-1¼
741 (800-1¼)
2320-2¼
801 (900-2¼)
2320 2½
801 (900-2½)
FAF to MAP 6 NM
Knots
60
90
120
150
180
Min:Sec
6:00
4:00
3:00
2:24
2:00

Your crew is being launched out of "Bravo" alert on a humanitarian relief mission for some flood victims.

1. While checking the FLIP IFR Supplement you note that Tri-City Regional is not covered by the Military NOTAM System. Who should you call to obtain the D Series NOTAMs?
   a. The Flight Service Station (FSS) serving your point of departure.
   b. The FSS serving Tri-City Regional.
   c. Any FSS can provide D Series NOTAMs.

2. Series L NOTAMs are conditions which would prevent operations in and out of an airport.
   a. True.
   b. False.

3. Who should you call to obtain the L Series NOTAMs?
   a. The FSS serving your point of departure.
   b. The FSS serving Tri-City Regional.
   c. Any FSS can provide L Series NOTAMs.

4. When planning for departure from a civil airport, the SID assumes the aircraft will cross the departure end of the runway at:
   a. 35 feet.
   b. 50 feet.
   c. 100 feet.
   d. 1 foot.

5. You are inbound to ENDAL and level at 7,000 feet. Approach control has just cleared you for the straight-in ILS. When should you descend out of 7,000 feet?
   a. Passing KEIPY intersection.
   b. Passing ENDAL intersection.
   c. Passing MOCCA.
   d. Passing DAMAS intersection.

6. The hightest obstacle/terrain is:
   a. 3,600 feet.
   b. 2,425 feet.
   c. 3,077 feet.
   d. 2,609 feet.

7. The minimum safe altitude at DAMAS is:
   a. 6,000 feet.
   b. 5,400 feet.
   c. 4,000 feet.
   d. 7,400 feet.

8. The star by Tri-City Tower indicates the control tower does not operate continuously. When the control tower is closed, what is the visibility (RVR) required for a Cat. C aircraft to fly the straight-in ILS-23?
   a. 1,800 feet RVR.
   b. 2,000 feet RVR.
   c. 2,400 feet RVR.
   d. 4,000 feet RVR.

9. Approach control has cleared you to proceed from DAMAS to MOCCA to fly the procedure turn. Before reaching MOCCA you should:
   I. Reduce to maneuvering airspeed.
   II. Reduce to holding airspeed.
   III. Reduce to 180 knots TAS.
   a. I only.
   b. II only.
   c. I or II.
   d. III only.
   e. None of the procedures.

10. Approach control has cleared you to intercept the localizer before you arrive at ENDAL. What is the usable and accurate range of a localizer from the antenna?
   a. 10 nautical miles.
   b. 18 nautical miles.
   c. 20 nautical miles.
   d. 22.5 nautical miles.

11. When should an ILS/LOC approach be discontinued?
   a. When the localizer course becomes unreliable.
   b. Any time full scale deflection of the CID occurs on final approach.
   c. Any time the flight director computer fails.
   d. Both a and b.

12. For a procedure turn entry, the teardrop course will be displaced a maximum of 45 degrees from the published procedure turn course on the maneuvering side.

a. True.
b. False.

13. What are the lowest circling minimums for a Cat. C aircraft arriving at Tri-City Regional?

a. 2,400 feet, 2 ¾ miles vis.
b. 2,400 feet, 3 miles vis.
c. 2,200 feet, 1 ½ miles vis.
d. 2,320 feet, 2 ¼ miles vis.

14. After checking winds there is a 12-knot tail wind component for landing on Runway 23. Since you are flying from the left seat you request to circle northwest to keep the runway in sight. Is circling northwest authorized?

a. Yes.
b. No.

15. During a circling approach you lose visual reference with the runway. You should:

a. Follow the missed approach specified for the approach procedure just flown

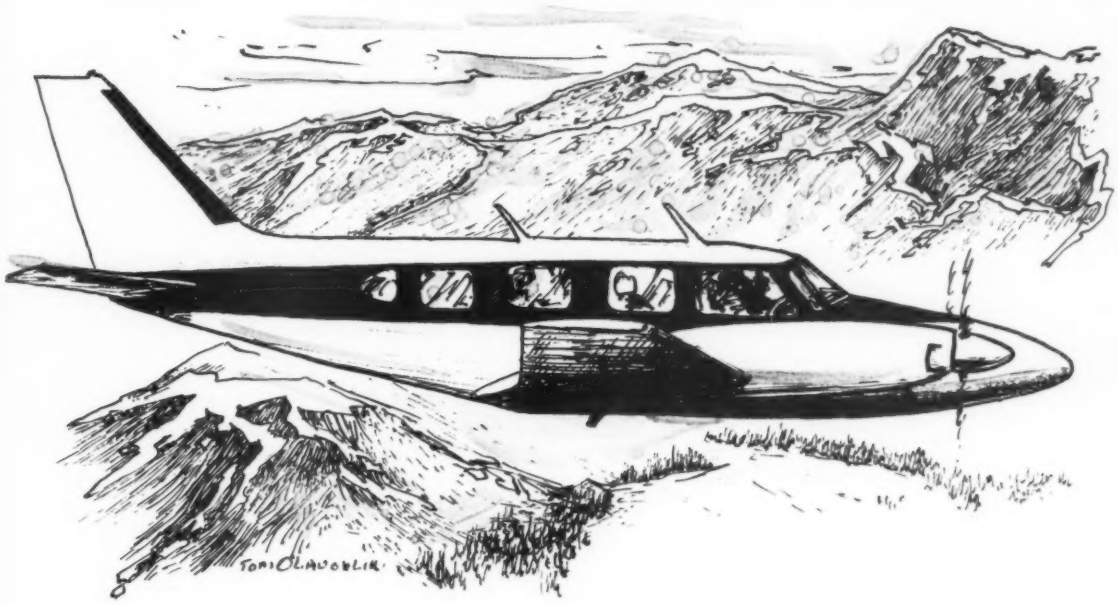
b. Follow the missed approach specified for the runway you were circling to.

c. Follow the missed approach specified for the approach procedure just flown, unless directed otherwise.

ANSWERS

1. c. Contact any FSS for D Series NOTAMs. (AFM 51-37, para. 7-3b.)
2. b. Series L NOTAMs are conditions that do not prevent operations in and out of the airport. L NOTAMs correspond to airfield advisories issued by military base operations. (AFM 51-37, para. 7-3.)
3. b. The FSS serving the destination airfield (in this case, Knoxville FSS for Tri-City Regional). (AFM 51-37, para. 7-3b.)
4. a. When developing SIDs at civil airports in the United States, civil authorities assume that aircraft will cross the departure end of the runway at least 35 feet above ground level. Air Force pilots flying civil SIDs must plan to cross the departure end of the runway at least 35 feet above ground level. (AFM 51-37, para. 7-4a.)
5. b. When cleared for the approach, maintain the last assigned altitude until established on a segment of the published routing or instrument approach procedure. ENDAL begins a "NoPT" segment. Passing ENDAL you may descend to 5,000 feet. (AFM 51-37, para. 10-6e.)
6. c. 3,077 feet.
7. d. 7,400 feet.
8. d. 4,000 feet.
9. c. I or II. Before reaching the procedure turn fix, reduce to maneuvering airspeed. Use holding airspeed if maneuvering airspeed is not specified for your aircraft. (AFM 51-37, para. 12-2b.)
10. b. The localizer signal is usable and accurate to a range of 18 nautical miles from the localizer antenna unless otherwise depicted on the IAP. (AFM 51-37, para. 5-6b.)
11. d. The ILS/LOC approach must be discontinued if the localizer course becomes unreliable, or any time full scale deflection of the CDI occurs on final approach. Do not descend below localizer minimums if the aircraft is more than one dot below or two dots above the glide slope. (AFM 51-37, para. 13-1b Caution.)
12. b. Due to airspace criteria, the teardrop course will be displaced a maximum of 30 degrees from the published procedure turn course, on the maneuvering side. (AFM 51-37, para. 12-2b.)
13. d. 2,320 feet, 2 ¼ miles vis.
14. b. Circling is not authorized northwest of Runways 9 and 23.
15. c. If you lose visual reference while circling to land, follow the missed approach specified for the approach procedure just flown, unless otherwise directed. (AFM 51-37, para. 15-2d.)

Flight 2001, Mechanical or Human Failure?



One man, one input, one incorrect decision!

Statistics have demonstrated time and time again that the greatest potential for a mishap exists during the takeoff and landing phases of flight. Every crewmember is aware of the possibility of task saturation and subsequent human error resulting in a fatal mistake. This threat shadows all of us during the first and last moments of flight. In the following case, a pilot's misinterpretation of what was happening resulted in disaster.

FLIGHT HISTORY

At 0611, 23 December 1987, a Piper PA-31-350 operated by South Central Air, Inc., as Flight 2001, N496SC, crashed shortly after departing Kenai Municipal Airport, Kenai, Alaska. The flight, a regularly scheduled commuter to Anchorage, Alaska, departed during the hours of darkness. An Instrument Flight Rules flight plan had been filed and activated prior to departure. On board were one pilot and seven passengers. Reported surface weather at the airport was, in part, as follows:

> Measured ceiling, 1,500 feet overcast; visibility, 7 miles, light-rain; temperature, 33-degrees; dew point, 29 degrees; wind, 020 at 8 knots; altimeter setting, 29.26 inHg.

About 2 minutes 23 seconds after advising the Kenai Flight Service Station (FSS) specialist he was departing from Runway 01, the pilot of Flight 2001 advised the FSS specialist that, "Central one has lost an engine and we're circling for (runway) one." The specialist acknowledged receipt of the message (the last known radio transmission from Flight 2001), and provided the pilot with the runway winds and altimeter setting.

The FSS specialist stated she saw Flight 2001 flying west of the airport. She said, "It appeared that he was not going to reach the airport since he was losing altitude . . . I observed the aircraft descend below the tree line west of the . . . airport." She told another FSS specialist to call the crash equipment.

Two passengers survived. One survivor said it sounded like an engine blew up about 300 to 400 feet AGL and he thought it was the left engine. He estimated the airplane climbed to about 500 or 600 feet

"Three different 'normal' operating checklists were found . . . "

AGL, made a left 180-degree turn, and began to slowly lose altitude. After the initial "explosion" he heard only normal engine noise. He could not see if a propeller was feathered, nor did he notice the position of the wing flaps.

The other survivor said he heard a "loud backfire" at or shortly after lift-off, but couldn't identify which engine had backfired. He stated the airplane gained some altitude, banked left, "circled back around and, as we were losing altitude, I looked out the window and noticed the flaps were down." He said "both motors were running," but it sounded as if one engine had more power than the other, "it was an unbalanced hum." According to the survivor, both engines were running "right up to impact."

Flight 2001 came to rest inverted in a house ½ to ¾ nm west of the Kenai Municipal Airport. The airplane and the house were destroyed by impact forces and post crash fire. Two occupants of the house escaped with minor injuries. The pilot and five passengers were killed. Two surviving passengers were able to get out of the airplane, and out of the house before the airplane exploded and burned.

ANALYSIS

Investigation showed the pilot was trained and qualified to operate the airplane. There was no evidence of physiological or psychological factors that would have affected his performance.

The investigation found the weight and balance documentation, prepared by the captain of the mishap flight, had one passenger in the right front (copilot) seat. This seat was unoccupied during flight. The change in seating resulted in the center of gravity being displaced 3.4 inches aft of the pilot's calculations. However, even with these errors, calculations showed the airplane's takeoff weight and center of gravity locations were within prescribed limits.

During the on-scene investigation, Safety Board investigators entered the cockpit of several South Central Air PA-31-350 airplanes. Three different "normal" operating checklists were found on board one aircraft. The first checklist contained the item "Flaps" on its Pretakeoff Checklist with the response—"Set 0." This was the proper checklist; however, it was part of the Airplane Flight Manual stowed behind the pilot's seat. A second checklist (of unknown origin) was found above the pilot's sun visor. In regard to "flaps" on the Takeoff Checklist, the response was—"Set." The third checklist, prepared by the company and carried by flightcrews, was the one used most frequently. This checklist omitted any reference to flaps. Unfortunately, due to the intense fire, a checklist was not recovered from the accident airplane.

The airplane was not equipped with a flight data or voice recorder, nor were they required. Additionally, recorded radar data was not available to reconstruct Flight 2001's flight path. Investigation showed Flight 2001 descended into the trees approximately 480 feet from the final impact site. The airplane descended in a wings-level attitude to initial impact, and continued in a slight descent in that attitude as it cut a swath through the tree tops. About 100 feet from final impact, it increased its descent angle and flipped over before crashing into the house.

Examination of the engines showed that neither propeller had been feathered, and both engines were operating at impact; however, the examination did not reveal whether they were operating at high or low power settings. Subsequent teardown inspections disclosed that the right engine's Number 3 cylinder head was cracked above the top of the cylinder barrel. The crack extended about 180-degrees around the cylinder head, propagated through the head, and had opened up. This would have prevented the cylinder from producing power. Additionally, when the crack opened up, it caused the intake pipe to separate. Breakage of the intake pipe caused turbocharged air to expel out the separated pipe rather than being fed to the engine. Loss of turbocharged air caused the engine to operate as a normally aspirated engine with subsequent loss of power.

A Lycoming LTIO-540-J2Bd engine is capable of producing 350 brake horsepower (BHP). It is esti-

mated that the right engine was capable of producing about 193 BHP after the cylinder head crack had opened and the turbocharged air was exhausted through the separated intake pipe.

Examination of the left engine disclosed that the cam lobes for cylinders 3, 4, 5, and 6 were severely worn. This cam wear would have had some adverse effect on the horsepower production. After a thorough review of existing data relating to power production, the manufacturer was unable to find baseline data upon which to estimate power production with severe cam-lobe wear. Engineers from Lycoming believe some loss from the effects of the worn cam lobes would have been recovered at high power settings due to operation of the turbocharger. However, the effects of the worn cam lobes probably was detectable through evidence of power loss from the left engine in comparison to the right engine at matched cruise throttle settings, and by poor starting and rough idle characteristics.

The examination of the airplane's flight controls disclosed that trailing edge flaps were extended about 37 degrees at impact. The recommended flap setting for landing was full down or 40 degrees. The rudder's trim tab was deflected full left at impact. This position would assist the pilot in moving the rudder to the right to counteract a leftward turning moment of the airplane.

The Piper PA-31 operating instructions indicated that no flaps should be used for a normal takeoff. A short field takeoff requires 15 degrees of flap. The Piper PA-31 Pilot Operating Manual states that the airplane cannot be flown on one engine if the flaps are fully, or nearly fully, extended and that except when taking off from short runways, the use of flaps on takeoff is prohibited.

One survivor indicated the flaps were down as the airplane started to descend into the trees. He did not notice the position of the flaps during takeoff or on initial climbout. Given the fact that the airplane was able initially to maintain altitude after the engine problem was encountered, the Safety Board believes the flaps were not extended at takeoff. Since 37-percent is not a recommended flap setting for either takeoff or landing, the Safety Board believed the pilot may have selected full flaps just before impact and that there was not sufficient time for them to fully extend. Therefore, the Safety Board concluded that the pilot extended the flaps at the last moment in an effort to prevent the airplane from stalling and to lessen the inevitable impact forces. Additionally, the landing gear was in the up and locked position and cowl flaps actuators for both engines were fully extended.

Witness statements provided evidence that Flight 2001 experienced some type of engine difficulties after lift-off. One of the survivors stated he believed it was the left engine which had experienced the problem. Position of the rudder trim tab indicated the pilot had come to a similar conclusion and had trimmed for right rudder deflection to compensate for loss of power on the left engine. The board determined that the crack found in the right engine's Number 3 cylinder had existed before the mishap flight but had extended and opened up during takeoff. Damage would have manifested itself with backfiring and other explosive sounds similar to those described by one of the survivors. Thus, the probability exists that the pilot misidentified the source of the engine noises, and retarded the throttle on the left engine in a mistaken effort to control the engine and lessen damage. This action would have caused the airplane to yaw to the left and would have required the pilot to apply right rudder. Since normal pilot action under such circumstances is to apply right rudder trim to relieve the rudder pedal forces, the Safety Board concluded that full right rudder trim indicated the pilot had reduced the power substantially on the left engine. Consequently, since the right engine was malfunctioning and was able to only deliver about 55 percent of maximum power, the pilot was unable to maintain altitude.

PROBABLE CAUSE

The Safety Board's investigation was hampered by the fact that most of the airplane was consumed by the post crash fire, substantially reducing the amount of factual evidence available. The absence of a cockpit voice recorder or flight data recorder further complicated the Safety Board's efforts. However, the Board believed the probable cause of this mishap was the failure of the Number 3 right engine cylinder during a critical phase of flight, and the pilot's mishandling of the emergency, allowing the airplane to descend and impact terrain.

APPLICATION TO MAC

The specter of human error is a concern for crewmembers each time they approach the flight line. In this case, the mishap pilot had over 14,000 flying hours and still was unable to correctly identify the malfunctioning engine. MAC crewmembers have a distinct advantage over the mishap pilot. We don't fly alone. The value of crew coordination is demonstrated each time an airplane is lost as a result of one man's mistake. As long as our crewmembers practice and strive to perfect MAC's crew concept, we should never have a Flight 2001.

Adapted From *NSTB Report AAR-89/03/SUM*

Official *TMF* Thunderstorm Quiz

Each time a crew takes to the air, it's forced to deal with two of Mother Nature's greatest forces, gravity and weather. Man can overcome the pull of gravity with mechanically produced horsepower, but there isn't much he can do about weather. In an effort to help prepare our aircrews for the upcoming rainy season, *TMF* has created a "stump-the-dummy" thunderstorm quiz. Source document involved is AFM 51-12, Volume I, Chap. 13.

1. Thunderstorms are almost always accompanied by:
   a. Strong wind gusts.
   b. Severe turbulence.
   c. Lightning.
   d. Severe icing.
   e. All the above.

Photo by Maj. Stephen Behr

2. About how many thunderstorms occur worldwide each day?
   a. 10,000.
   b. 44,000.
   c. 22,000.
   d. 31,000.

3. Thunderstorms can be found in:
   a. Tropical regions.
   b. Mid-latitudes.
   c. Arctic regions.
   d. All the above.

4. In the United States, thunderstorms are most frequent during the months of:
   a. May and June.
   b. June and July.
   c. July and August.
   d. August and September.

5. The basic requirements for formation of a thunderstorm include:
   a. Unstable air.
   b. Lifting action.
   c. High moisture content.
   d. All the above.

6. In the United States, thunderstorms are most frequently found in the:
   a. Northwest and Midwest.
   b. Northeast and Southeast.
   c. Southcentral and Southeast.
   d. Midwest and Northeast.

7. The life cycle of a thunderstorm will last from:
   a. 2 to 4 hours.
   b. 20 min. to 3 hours.
   c. 30 min. to 12 hours.
   d. 2 to 8 hours.

8. Thunderstorms may occur within the cloud system of any front.
   a. True.
   b. False.

9. The *most* severe conditions are found in:
   a. Cold front thunderstorms.
   b. Squall line thunderstorms.
   c. Stationary front thunderstorms.
   d. Air-mass thunderstorms.
   e. Both a and b.

10. The *least* severe frontal thunderstorms are found in:
   a. Warm fronts.
   b. Cold fronts.
   c. Stationary fronts.
   d. Occluded fronts.

11. Thunderstorms that form on the windward side of a mountain when wind forces moist, unstable air up the slope are called:
   a. Orgraphic thunderstorms.
   b. Mountain effect thunderstorms.
   c. Convergence thunderstorms.
   d. Occluded thunderstorms.

12. Thunderstorm-related hail has been encountered as high as _____ and as far downwind as _____:
   a. 40,000 ft. 15 miles.
   b. 35,000 ft. 15 miles.
   c. 45,000 ft. 20 miles.
   d. 50,000 ft. 25 miles.

13. The storm cloud is the visible portion of a turbulent system whose updrafts and downdrafts often extend outside the storm proper.
   a. True.
   b. False.

14. Cold front and squall line thunderstorms with an extremely turbulent zone are often marked on the leading edge by the presence of a:
   a. Roll cloud.
   b. Cumulus cloud.
   c. Anvil cloud.
   d. Cumulonimbus cloud.

15. The majority of thunderstorm lightning discharges strike the ground.
   a. True.
   b. False.

ANSWERS—1. e; 2. b; 3. d; 4. c; 5. d; 6. c; 7. b; 8. a; 9. e; 10. a; 11. a; 12. c; 13. a; 14. a; 15. b.

"Gateway to Europe"

By Maj. Stephen E. Behr
Associate Editor

Rhein-Main Air Base, Germany, the "Gateway to Europe." It's the first place most military folks arriving from the United States see as they begin their tour of duty in Germany, or one of the surrounding countries. It's a base familiar to many MAC crewmembers, and it's home to the 435th Tactical Airlift Wing. In keeping with the finest MAC traditions, I arrived here at o-dark-thirty after an all-night flight from the States. I was met by Capt. Phillip A. Misseldine, a flight safety officer for the 435th. It was great to be back in the land of real bratwurst, *Jager* schnitzel, beer, and *Weihnacht Markt.*

435 TAW headquarters.

Welcome to Rhein-Main!

The primary 435 TAW mission is to provide tactical, aeromedical, and administrative airlift in the European Theater. The wing also supports the operations of stateside-based strategic airlift aircraft. The 37th Tactical Airlift Squadron provides tactical and logistical airlift with C-130 Hercules aircraft. The 55th Aeromedical Airlift Squadron provides flight crews to fly C-9A aircraft, while the 2d Aeromedical Evacuation Squadron (a part of 375 AAW) provides medical crews for the C-9 Nightingales.

Even though the wing is labeled "tactical," there are some folks around Rhein-Main who say "you can't really put a title on the wing." As Col. John W. Handy, Wing Commander, said during our interview, "The 435th could be called a 'Military Airlift Wing' since the volume of airlift traffic is far greater than our purely tactical business. Our location alone puts some unique demands on our safety folks—we're a wing at an international airport. My safety folks must educate crewmembers on a dramatically broad range of weather hazards—a crew can experience dense fog and severe icing here and a few hours later be dodging thunderstorms—all in one mission. Traffic mix is another challenge. While a C-130 crew is flying a category I ILS, a civilian jumbo jet may be right behind making a CAT II approach.

"As more and more east/west barriers come down, we've got to increase our awareness of safety and operations in East Block countries. Events taking place in Eastern Europe are leading to an expanded range of operations for both C-9 and C-130 crews. It's a new challenge for our crews; one nobody could have anticipated. Even cargo flights to West Berlin are getting a lot more attention—it's an exciting time to be flying in Germany."

Just down the hall from the Wing Commander's office are the safety folks led by Maj. Jerry D. Eskam, Chief of Safety. His chief of flight safety, Capt. Douglas G. Goering (Maj. Sel), accompanied Captain Misseldine and me to different units on base. Other folks in the flight safety office are Capt. Robert F. Aten (Maj. Sel), and SMSgt. Johnny B. Harp. According to Captain Goering, "Joint use is a challenge; the German standards are often very different from USAF or FAA standards. With all the C-141s and C-5s transiting, much of our work is investigating reports they bring back from down range stations. When there is something to investigate, we have to be quick if we need to talk to a crew, since they are just here for a short RON. Another source of variety is dealing with hazards in East Block countries—that guidance hasn't been written."

After departing the safety office, *TMF* visited with the Deputy Commander for Operations, Col. Walter S. Evans. He began our interview by saying, "If you changed the name of this wing it might make some sense to call it the 435th Aerial Port Wing, because this is the largest port in Europe. It's appropriately named the 'Gateway to Europe,' with all the personnel and cargo arriving daily. There is a very massive port system here supported on a daily basis by commercial freighters, contract carriers, C-141s, and C-5s. That's a very large part of our wing mission—supporting the en route traffic flow. Our command post controllers work an average of 324 departures for en route missions and nearly 220 departures for base assigned aircraft. This is a very interesting place. When anything happens in Europe you can count on Rhein-Main getting involved to some degree."

When asked about challenges faced by 435 TAW folks, the colonel detailed the difficulties in conducting training. "Our toughest challenge for C-130 folks is finding training areas. We compete with the Army for limited training areas and deal with political restrictions. We don't fly trainers on weekends; we stop all flying training on Friday afternoon, all because of noise sensitivities. We don't have our own traffic pattern; when we want to shoot some touch and goes, the current ops folks have to get PPRs for every place the trainer may go. The day prior to a pilot proficiency sortie, the instructor pilot comes in and spends time arranging for a time slot in which to do the training at the available military bases.

"We have an AWADS mission and only one AWADS drop zone, which is in an Army artillery and tank training area. And we aren't the only C-130s using the DZ; we share the slot time with 7 SOS guys. It takes a lot of coordination to ensure everyone gets their training accomplished. If ceiling or visibility aren't good during our slot time on the DZ, or we have difficulty getting airborne, we lose some of our training.

"Winter weather is another challenge to completing training. In order to get our visual drop training accomplished, we ship the crews off to where the sun shines—either Spain or Portugal, with whom we have training agreements, or Aviano, Italy. When we go to Aviano, a three or four-ship links up with the Air-

Mission commander, Capt. Frank E. Curran (standing), briefs the morning tac line.

Col. John W. Handy, Commander

borne Battalion to make drops. A lot of our training has to be done outside of Germany.

"Airdrop isn't the only mission we have. We know most days we will launch four or five logistical missions. It makes the 37th squadron attractive; crewmembers get trips to many different places to support our embassies. The 55th Aeromedical Airlift Squadron has a regular daily schedule of airevac missions. The C-9 operates great— it's very reliable. The scheduled airevac missions are fairly routine but an alert/urgent mission can wind up just about anywhere.

"One challenge facing everyone departing Rhein-Main is the ATC system. We occupy the other side of the runway from the second largest commercial airport in Europe; the largest on the continent. We have to compete with everyone else in getting slot times for takeoff. Airlines can forecast their slot time needs six months in advance; we can't be that precise when short notice missions are added on. Flow control is an every day fact of life with the overburdened ATC system. The airport is limited to 64 movements per hour, maximum. We're trying to make it better for the crews by prefiling missions and getting slot times."

One way to discover the challenges and hazards faced by crews is flying a mission with them. I was set up to fly on a Friday morning tactical mission— show time was 0230 (these guys sure like to get up early to fly a local). The ride to the squadron indicated the type of day is was going to be: foggy. The mission commander, Capt. Frank E. Curran, briefed that the drops for "Bunker DZ" would be made using AWADS—weather at the DZ was reported as 200-foot ceiling and 200-meters vis. (That's 656 feet for you non-metric types.) Both aircraft would be dropping one heavy equipment pallet, followed by multiple CDS drops—no training bundles. Loadmasters from the 4th Mobile Aerial Port Squadron (4 MAPS) would be receiving checkrides, not to mention one of the navs getting re-qual training, and local orientation for a newly arrived AC. Our two-ship would be the second flight of 435 TAW C-130s to drop, and a single ship would precede us to the DZ. One of the briefed items got my attention as I looked at the tactical map—the escape route entered the German ADIZ along the Czechoslovakian border—something most airdrop units don't have near their training areas.

With the briefings completed and multiple flight plans filed (to cover contingencies), we departed the squadron. No sooner had the crew bus arrived at the designated aircraft than a tail swap was directed—this put us on the spot next to lead, a Herk with an engine run in progress. The fog looked like frost forming in midair. After a brief delay, we were cleared

Herk getting spruced up.

onto the plane to preflight. The flight engineer and loadmasters from lead assisted our crew in preflighting the Herk. Visibility had now decreased so much that lead was no longer in sight; ATIS was reporting "CAT II ops in progress."

The sound of a single Herk taxied by and faded into the fog. Captain Curran appeared at the crew ladder to consult with Capt. Thomas M. Holder, our IAC. Visibility would not allow a formation departure, so the single ship IFR flight plans would be used. The loading crew from 4 MAPS was patiently waiting for the go ahead to load the aircraft as maintenance finished buttoning up the engine. Additional fuel for an alternate outside of Germany was onloaded as rigging continued. With airdrop loads positioned and rigged, doors were closed. Our lead had been de-iced, started engines, and taxied out; now we were waiting for the de-icing to be completed. The ground crew opened the crew entrance door and said de-ice was finished. Engine start, taxi, and takeoff were uneventful; as we climbed, following the SID, we broke out of the fog into VMC.

A few high hills poked through the blanket of fog. Now that our TOTs for the range and DZ were approaching, Captain Holder coordinated to cancel the AWADS low level route and proceed direct to the

IP near the Erlangen VORTAC. In the meantime, we heard the other Herk talking with CCT about DZ ceiling and vis—both nil. Checklists were completed, but the doors stayed closed as we made a dry pass; escaped and headed back to Frankfurt. Approach sent us to holding and for 45 minutes we "chased" lead around the pattern.

Lead was vectored out of holding and into approach sequence; four minutes later Frankfurt Approach assigned a heading for us. The weather was at minimums for the ILS Runway 07R. We descended into the fog and at decision height went missed approach—the aircraft behind us landed. The "Director" vectored us around for another ILS; Capt. Josh Jose, instructor navigator, assured us we still had enough fuel to make the alternate and practice holding again.

The second approach was uneventful as the approach lights came into view before reaching DH. The Herk touched down and rolled out. The copilot reported our progress to Tower and Ground as we taxied back to Rhein-Main's ramp. My introduction to tactical flying in Germany was over.

Following the flight, I dropped in on Lt. Col. Robert N. Boudreau, 37 TAS Commander. "Welcome to winter in Germany," he began. "If we didn't have AWADS, we wouldn't be able to do any drops locally in winter. Our guys get very good at flying AWADS in winter time. We call ourselves the 'eyes of MAC in Europe,' because we can lead other aircraft to DZs. It's ideal to have us in Europe; our primary users are the airborne folks in Italy. Due to the difficulty of training in Germany during winter months, we will deploy to Aviano or other places in Italy, just to keep up with our visual drop requirements.

"Another challenge for us is that at Frankfurt, we can only take off and land once; so we go to the Eifel region to train. We try to sequence our times for takeoff to avoid the peak periods of civilian traffic. The ATC system isn't very flexible—there isn't a stopover flight plan—so a crew may file three or four flight plans to enable them to fly a pilot pro sortie. Even with the training difficulties, most crew members love it here since we aren't limited to training full time; we get airlift missions to interesting places."

After departing the tactical side of the 435th it was time to visit the airevac side, the 55th AAS commanded by Lt. Col. Maurice J. Roy. The C-9 airevac operation links the many small hospitals in the theater with the regional medical centers and provides connections with intertheater airevacs. "Our squadron has its own diplomatic clearance and current operations sections apart from the wing. Even though many countries exempt us from some dip clearance requirements, many are still required. When we launch our alert mission, our duty officer works the clearance as well as flight planning. The alert/urgent mission can be really challenging at times. If you're launched late at night and return in early morning, you've been going on adrenaline all night; there's a big letdown after landing and you still face the 30 or 40-minute drive home. Getting home safely then becomes the challenge." The folks in 55 AAS have logged more than 79,000 mishap-free flying hours over 21 years.

Flyers aren't the only folks at Rhein-Main facing challenges. Some maintenance folks are off-base, but still on the Flughafen. Col. Roger L. Cogswell, Deputy Commander for Maintenance, described the mission of maintenance as, "being half en route and half home station. We have the only MAC fuel cell repair facility in Europe, so we support a lot of C-141s and C-5s. In the states, a MAC airplane that develops a major system malfunction gets diverted to a MAC base with similar aircraft. Here, we are the people that fix those C-5s and -141s; we have to be able to work on any of MAC's airplanes that show up. Our folks also support SAC KC-10s, contract carriers, and even Russian aircraft supporting the INF Treaty.

"We adhere to the quiet hour rules to maintain good relations with the community. Quiet hours practically shut down engine run capability for C-5s, C-141s and C-130s. It backs up a lot of maintenance, because at 0600 we've got all these airplanes waiting for engine runs and we run out of bodies to conduct them. If the engine run shows the adjustment or fix wasn't correct, the delays begin. Through all this, we have to remember that we are the foreigners here."

Speaking of foreigners, this is one that certainly enjoyed visiting Rhein-Main again. There were many changes from the days when I was flying the line. Some things don't change though—my B-4 bag is bursting with dirty clothes, must be time to depart. It was a successful trip. All my checklist items were completed, thanks to the folks at 435 TAW Safety.

(Director's Comments: We pulled this article out of our archives and thought our readers might enjoy a look back at the way things were perceived in the sixties.

We've come a long way from the sixties' narrow-minded views about marriage, family, and the wife's responsibilities in providing a "well-run and happy home." Specifically, "the little woman's" skills as a "good kitchen mechanic," whose job was to hop out of bed to cook hubby's bacon (cholesterol was hardly a reason for concern in those days) may give you reason to smile.

Lieutenant Rhett Bullfiddle and his wife were pioneers in the sixties' military married world, perhaps. His wife shared her anxiety and frustrations with "modern" appliances and raising kids and, obviously, Rhett was willing to spend some time doing what she wanted to do. If he was too lazy or helpless to fix himself a healthy breakfast, that's his problem. But the macho author of this article concluded, "poor Rhett."

The human factors study was just starting to emerge as a concept encompassing various factors that cause people, specifically aircrew members, to react the way they do. If the pilots are causal in a mishap, we are not satisfied to simply explain their involvement as "pilot error." We want to know more about why the individual did what he or she did and how the entire crew dealt with a problem, and why.

Certain concepts are still true today. We agree that happy, content people make better, safer crewmembers. Therefore, marital harmony is certainly important. But, we don't have any prescription for who accepts what roles and responsibilities for household chores and child rearing; whatever works for your family is best.

We admit we find it incredible, as you probably will, that our TMF predecessors were dispensing their ideas about marital roles, "in the interest of flight safety." On the other hand, this article probably reflected the generally accepted philosophy of the day, at least from the Air Force perspective.

In spite of all the changes in attitudes and ways of thinking over the last twenty years, a relatively happy and contended flyer still helps make a "safe flyer.")

HUMAN SENSE

Hey Crewmember! This article is for you!

Under ideal conditions, pilots are as finely tuned as a good violin. It would be dandy if this was always true. Trouble is, pilots, like violins, get out of tune. It doesn't take a major catastrophe to do it, either. Without any reason, pilots may wake up flatter than a three-dollar guitar.

A pilot gone sour needs a tuning job immediately, or he may do something like plunging three counties into darkness by dragging down several miles of high-tension wire. When such an event takes place, dozens of people converge on the scene to launch an investigation that would make Sherlock Holmes reel with admiration. The aircraft is pieced back together, witnesses are questioned, and weather charts are consulted. If he is available, the pilot's brains are picked. Every stone for miles around is turned at least once. And all too often the investigators can only pack up their statistics and move on, dolefully muttering, "pilot error." Pilot error?

There is more here than meets the eye. The term is a large one and covers certain mysteries of human behaviour.

Say Again

Is simple ignorance, pilot error? Obviously, if Elmer Snodgrass, National Plowing Champion of 1956 sits behind the controls of a C-141, something awful will happen. Tussling with tractors is Elmer's bag, and airplanes are poison. So he can't be guilty of pilot error. The fault lies with the person who would let 'ole Elmer try to fly.

An error can be committed only by a man trained to know better. Experts sometimes refer to that kind of error as the "human factor" behind mishaps; everything the pilot did or failed to do that led to the crash. And why.

The *why* is often mysterious. Many times the pilot can't say why himself; if he could, he wouldn't have crashed in the first place. Here is the cold truth: A man who has performed a simple action the right way hundreds of times before, suddenly does it exactly backwards. What goes on here?

One answer may be that accidents involving human factors occur when the pilot is not functioning the way he should. He's out of tune, running a little rough, developing a ping. Nothing really wrong, but ripe for conditions investigators have to label "pilot error."

Most anybody can spot a man in the clutches of chilblains, whooping

"A pilot may be cheerful as a chipmunk and yet be gnawed on by money problems . . ."

cough or the seven-year itch. Pilots with such ailments are red-X'd until cured. But spotting an individual slightly out of tune is not quite so simple. He may be out of tune physically, emotionally, or both—and the naked eye sees nothing. He may act cheerful and yet be gnawed on by money problems or the state of a sick child. His in-laws can be running him into the ground while he still looks as serene as a poker player with four aces.

The human being is complicated and some emotional disturbances are brought on by causes so deep a pilot doesn't even know they're there. All of us are constructed out of a mass of instincts, fears, anxieties, resentments, frustrations, reactions, and desires, but we still make out all right, most of the time. Still, if one of these inner anxieties gets out of hand, we can be in for trouble.

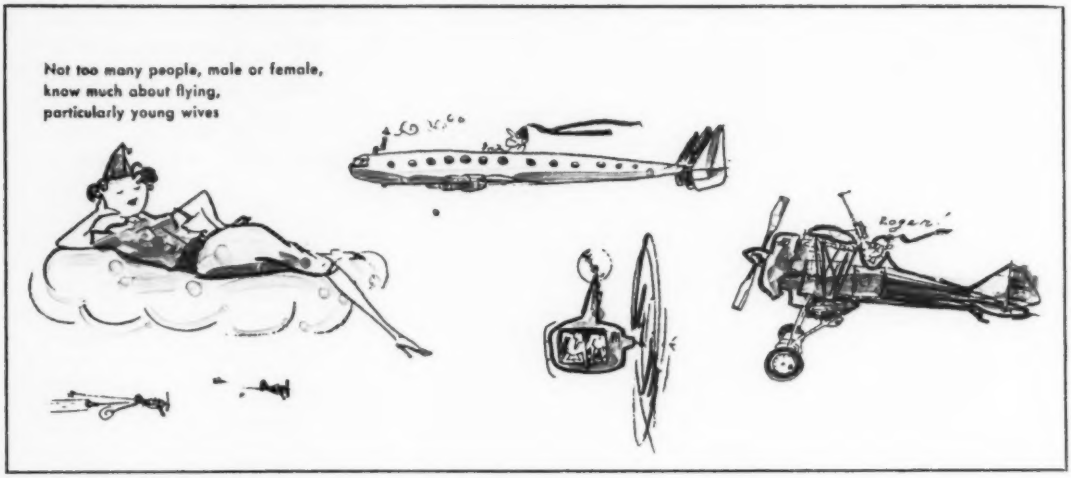
Take this business of flying. For all of us, it's an unnatural act. Man is a creature of the land. We may get used to being aloft, but we'll never be fully at home there. What's hard for us to face is that we all share a touch of the same natural apprehension about being up there with the birds.

Superstition

A curious fact about superstition is that you don't actually have to believe in one to have it affect your actions. An Army pilot lost two friends in closely-spaced mishaps. Now this pilot knew his superstition about mishaps always happening in "threes" was strictly stupid—and in theory was having none of it. Still, his flying mates noticed he was becoming moody and withdrawn, and his ability deteriorated almost visibly. In spite of himself, he was becoming obsessed with the idea his number was up. Coming in for a routine landing, he overlooked a fence across the end of the strip and snagged his underpinnings. Luckily he was only scratched, but his lapse could have made the "it-happens-in-threes" mumbo-jumbo come true.

What happened? This pilot allowed his natural grief to affect his judgement until plain raw emotion took over. Chances are, if this fellow had the good sense to tell somebody what was eating him, the whole affair might never have happened. Bottled up emotion and weird ideas can grow in the human mind. That pilot may have been trying to make the old superstition come true.

No one wants you to be a do-it-yourself flight surgeon or



psychologist, but a capacity for mature self-appraisal is a valuable asset. No grown man is really afraid to ask others for help.

Pilots upset by genuine fear of flight or old superstitions are rare, but people, pilots included, with some kind of trouble are not. A gnawing little fear or anxiety can grow to absurd dimensions unless you tell somebody about it. The thing to do is TELL SOMEBODY. There are friends, fellow crewmembers, roommates and wives—all usually ready to lend a sympathetic ear.

Tell Your Wife

The pilot who has a good kitchen mechanic can count his blessings. No woman can live with a man very long without getting to know him fairly well. His whims and quirks—he likes to spread chocolate syrup on salami and rye sandwiches—becomes part of her storehouse of knowledge. She becomes the world's leading expert on her husband.

Just as a good engine mechanic can cock an ear at an aircraft engine and tell if it is out of whack, a good kitchen mechanic can listen to her husband (or watch him a while) and tell that he's not in top shape either. Not only that, but like the aircraft mechanic, she knows what to do about it.

A man needs somebody to tell his woes to. Worry causes confusion, while confiding usually brings relief. With a load off his mind, a pilot's efficiency in the air goes up sharply. So an experienced wife spends more time listening than her husband will admit. She learns early that her job is just about as complex as her husband's. It has at least four separate functions:

1. Providing a well-run, happy home.
2. Keeping the lad in tune.
3. Encouraging him to do his best and,
4. Understanding the nature of his job.

Unclassified Stuff

If a pilot chooses to clam up about his job, his wife can do little except speculate whether he's managing a parakeet farm or counterfeiting three-dollar bills. This is a poor recipe for a content wife or a happy home. Most wives do care, and lucky the man with sense enough to let his wife help him.

Not many young wives know much about flying. Many of them haven't set foot in an aircraft. Their notions of flying are derived from old television movies, magazine articles and an occasional glimpse of the flightline by the BX. She may be dimly aware that her husband's job is (a) glamorous and (b) dangerous, and why don't they wear those darling riding britches anymore? She may think her man sails off into the wild blue each day and plays among the clouds. And then she can't understand when he comes home looking as if he's spent the day digging ditches. (Can there be another woman?)

You owe it to your wife to see that she isn't left in the dark about your job. She doesn't have to know how to operate every gimmick in the cockpit, but she must realize what your problems are. A wife properly checked out by her husband is an understanding wife—the kind that keeps a stiff upper lip when he calls in from 500 miles out to say he's weathered in and won't be home until tomorrow. She may be disappointed at missing the club dance, but you won't hear her complain. She's one wife who will never encourage her man to stick his neck out and try to beat the weather. She knows what happens to outstretched necks. That girl is a sound member of the family team because her husband has let her in on the tricks of his trade.

Casa Bullfiddle

Let's take a look at the homestead of Lt. Rhett Bullfiddle. He is a fine pilot, but most of the time he's as tired and jumpy and about as out of tune as you can get. He doesn't know he's suffering from chronic fatigue, and that more than one night's rest is needed to repair him. When he gets home at night he's met by a tale of woe that would wring the heart of Scrooge. The washing machine has given up the ghost, the dog bit the postman, Junior has been expelled, and the landlord is raising the rent.

Staggering under his burden, he sits down to a meal that turns into a fight to get the baby to eat his oatmeal. Dinner is followed by a trip to the club and another unsuccessful effort to win the grand prize, a 50-foot cabin cruiser. It is past midnight before he finally gets to bed.

The next morning our hero is up at five in order to be at the flightline by six. He gulps two cups of black coffee and goes to work. He's already behind his own goal line.

What poor Bullfiddle needs is a home. He needs a wife who appreciates the fact that the world holds more than a bingo prize. He needs a wife who will get up in the morning and

cook his breakfast. He needs consideration.

A man who has those things is ready to fly. All Rhett Bullfiddle is ready for is trouble. He becomes vaguely discontent, what psychologists call "development of a resentment complex." He's ready to snag a string. The world is against him.

Safety experts believe this resentment complex to be one of the great unknown causes behind accidents. A man doing a slow turn inside is likely to wrench his flying machine around as if it were a bulldozer. In short, caution goes over the side. Then he is in trouble.

The Lows

Bullfiddle's case is extreme, but all of us have days when it doesn't pay to get up. Even in the best-organized households, wives weep and strong men shudder. You cut yourself shaving, the little woman burns herself cooking your bacon and the baby has red spots all over. You hit the garage door backing the car out and halfway to the base you remember you forgot your wallet. What can you do? Sit tight, take a couple of deep breaths, and face the fact that this isn't going to be your day. Apply the brakes. If you're going to live through the day, extra caution is in order. You're just not up to the mark.

Since we're all different, there is no exact human yardstick we can use to measure just how far off we are. The only check we have is how far off we are from the way we usually feel. Stop and take a long, cool look at yourself—you're the only one who can.

The Highs

Even feeling too good can be bad. Have you inherited a fortune? Gotten a new son? Been promoted? Great! But keep a firm grip on your emotions or you'll turn into as much an aerial cowboy as Bullfiddle.

Have a care. Complacency or inattention can lurk behind the error that lies behind the mishap. It's a safe guess that high spirits have caused some mishaps. Everyone admires the man who whistles while working. The trick is not to let the whistling become more important than the job at hand.

Down To Earth

Let's talk about the old stuff. The first lesson a budding pilot learns is that more skill is required to come down than to go up. There's no real mystery about that. But what we may fail to consider are the special psychological and physical factors that can catch us off guard.

A fellow taking off in the morning on a long flight may not be at 100 percent of his physical and emotional capabilities, but he won't even notice. Takeoff generally requires about 50 percent of his capability. Level flight calls for no more than 20 percent. Then he flies for several hours, lowering his energy reserves. Toward the end of the flight, he has narrowed the margin between what he needs and what he has. Landing may require 60 percent (or more) of his full potential. At this

point, our friend may have only 80 percent of what he started with; that closes the gap and doesn't leave much to play around with. What's more, this capability varies widely among individuals and isn't precisely measurable. If this pilot is thinking about the little woman or a good steak instead of putting the gear down, he's setting himself up as another victim of "pilot error."

Fresh Out Of Fuel

What pilots eat (or fail to eat) is another factor behind pilot error mishaps. The human body is a machine that works on energy manufactured from the food it consumes. While you wouldn't consider trying to fuel an airplane with dishwater, you might try to scrape by eating too much, too little, or improperly.

Let's go back to Rhett Bullfiddle. He didn't get a real breakfast. A cup of coffee has no calories, so Bullfiddle is coasting along on the food taken aboard the night before. His blood sugar level is low, so his capability has been reduced right at the start. Sure, his energy level will rise a bit with the soft drink and flight lunch, but it isn't going to stay there all day. Bullfiddle has nothing in his reserve tanks. Coming in for his final landing, he has to crab into a crosswind. As he touches down he forgets to straighten out. Off goes the landing gear.

Pilot error? How about the lack of a sound diet? It can be the death of a man in more ways than one. Mrs. Bullfiddle may not look ravishing over a hot stove at 6 A.M., but she won't look any better in black.

Overstuffing can be as bad as undereating. A sound, well-balanced diet is every bit as important to a pilot as a sound, well-balanced mind. Your kitchen mechanic should know this. Her husband shouldn't look like a department store Santa Claus. And he shouldn't stumble out in the morning with nothing but a cup of coffee to hold him, either.

Pulling Together

Nobody has to go it alone and no team is more important than the husband and wife. For people who fly, a peaceful and well arranged home life can make the difference between doing a job decently or miserably.

A husband and wife team assignments are different but related. The pilot should to try to cultivate a well-adjusted personality; the capacity for mature self-appraisal; an understanding of normal emotional upheavals; a sensible approach to personal problems; and a normal home life. A good wife must develop an understanding of her pilot's job; the capacity to shoulder her share of the family burdens; the ability to keep her husband at the peak of his game; and the considerable skill required to provide a real home. A good marriage is a work of art produced by a team.

Take Me To Your Leader

How well you carry out your team assignments is a measure of how responsible a person you are. The same goes for your wife too. No flat notes, please. No Bullfiddle syndromes. No curious mental quirks which lead to "pilot error" when bottled up inside.

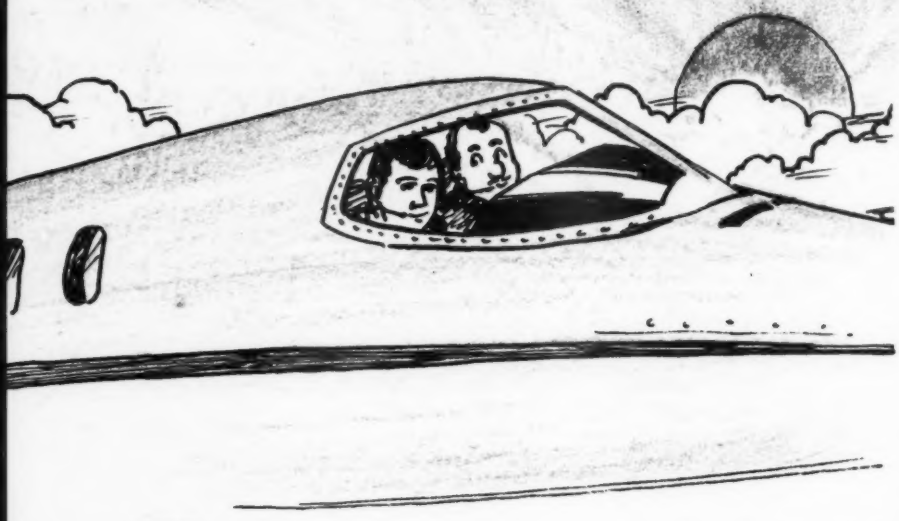
A man is the sum total of everything he has ever done. As the medical men say, "If you've never been confronted with a particular kind of emergency, you haven't had enough experience." You can apply that to flying, too. The longer you fly, the more emergencies come along to test your abilities. Only a finely-tuned responsible man can successfully cope with them all as they arise.

We think even one Lieutenant (or Mrs.) Bullfiddle is one too many.

TMF 1969

C.R. TERROR

A wild ride through winter wonderland.



The first traces of dawn were beginning to brighten the eastern sky over the long-abandoned corn fields around Boondock AFB. The Silver Tongued Fox, Major C. R. Terror, and his faithful follower, Capt. Long Sufferin' Sam, had just slipped the surlies in their sleek C-21 MAC biz jet for a quick out 'n back. Today's mission would take the Dynamic Duo to Wrong Pot AFB to pick up the notorious Gen. Lockjaw from a speaking engagement at the MAC Museum of Motored Artifacts (planes, not pilots). As luck would have it, Blinky, Max, and Ty had managed to get aboard as space A pax for a little sightseeing.

"Yes m' boy, this is the life," chortled The Great One. "The hours are a bit early for my liking, but the scenery this time of day can't be beat."

"The scenery looks fine *now*, boss," echoed Sammy, "but according to the weather sheet, our destination could be in for some unseasonably cool temperatures."

"Tut, tut, lad. The icy chill of the 'winter of '89' is long gone. My vast experience and knowledge of weatherology predict clear sailing for our two-day extravaganza."

As the sleek minibugsucker leveled at FL 350, C. R.'s chronically short attention span shifted into high gear as he related war story after war story to his illustrious copilot. It seemed to Sammy as though his intrepid leader had flown most, if not all, the relics now on display in the halls of the MAC museum. Sammy also realized the once portly pilot was considerably more talkative since returning from Tassle's Fat Farm—must have had something to do with having his mouth wired shut for so long. A quick glance to the rear of the cabin confirmed Sammy's suspicion—that of being C. R.'s captive audience—and revealed only a sea of snoozers as Blinky, Max, and Ty checked their eyelids for leaks.

The flight was uneventful, save a little turbulence, as the C-21 passed a cold front which, Sammy noted, was clearly marked on their weather sheet. As they taxied to parking for the night, C. R., the Prelate of Prophetic Pronouncements, predicted the same clear skies and balmy weather for their return flight the following day. Sammy could only shake his head in quiet resignation, as he crawled into the aft baggage area to retrieve the engine covers.

Following a Terrorific Tini or two at the Wrong Pot watering hole, the crew met at one of the area's finest eating establishments for massive amounts of oriental cuisine.

"You'd better take it easy on the grease, boss," warned Blinky. "You know how it affects your system after losing all that excess baggage last summer."

"Balderdash, m' faithful plotter of LOPs. This constitution can handle any epicurean wonder—in any amount."

"Whatever you say, boss," chuckled Blinky, as he traded knowing looks around the table.

The morning air was crisp and cold as the twosome checked out of billeting and dragged their bags to the biz jet. Blinky, Max, and Ty were taking in the sights of the museum while the general addressed the crowd on the finer points of the venerable C-124. All were to rendezvous at base ops for a mid-afternoon departure. C. R.'s night was predictably restless as a direct result of the vast amounts of shrimp fried rice, egg foo young, dim sung, kimshe, lumpia, and pork chow mein consumed.

The Petulant Pilot's prediction for spring-like weather was a bit off the mark as the wind howled and clouds thickened.

"We'd best make a quick stop and chat with the Dispensers of Weather Wisdom before we get too far along with the planning," quipped C. R., "The cumulus build-ups will not deter us from our appointed rounds, however."

The bandy-legged briefer, Captain Cyrus Cirrus, did not tell C. R. what he wanted to hear. "If you're getting out of here today, you'd better get moving," warned MAC's crack meteorologist. "We're expecting a freak snowstorm with heavy accumulation to start some time this morning and last through the day."

"Nonsense, m'boy," muttered the once portly pillar of pilotdom. "Why, I've frequented the footless halls of sunsplit clouds for eons and never heard such balderdash."

With that, C. R. turned on his heels and headed for the flight planning room. As he passed the double sliding glass doors leading to the flight line, a glint of fluffy white caught his eye. "Ahem, heh, heh, heh, I hope the general isn't as long winded as usual," mumbled C.R.

The snow continued to fall as C. R. and Sammy killed time in the crew lounge watching the latest episode of "The Old and the Weary" on cable television.

The soap opera plot was thickening as fast as the snow on the ramp when Blinky, Max, and Ty stumbled through the door of base ops, out of breath from the laborious trek through the winter wonderland.

"Looks pretty nasty out there, boss," commented Blinky as he brushed the white stuff off his flight jacket. "The general's right behind us. What are ya going to tell him?"

"Tell him? Why, a little snow isn't going to keep our all-weather leaderjet on the deck. We're going home, men. I've got a hot date with Charlene Charming tonight, and nothing is going to disappoint the lass."

At that moment, General Lockjaw strode through the door, his stars glistening from the wet snow.

"Well, Terror, what's the holdup?" shouted the general.

"Er, not a thing, sir," stammered C. R. "Sammy, order the deicing truck and let's be off."

One more of C. R.'s infamous low passes through the weather shop revealed no change in the forecast, with a current RCR of "wet."

"That's good enough for me," muttered The Omnipotent One, as cast and crew exited base ops for the air machine parked directly in front of the building. Four trips to the men's room behind him, C. R. felt he had sufficiently emptied his system to allow for an uninterrupted flight home.

Deicing the MAC biz jet took less than 10 minutes and was completed just as C. R. and Sammy assumed their driving positions in the cockpit. As C. R. strapped in, the general stuck his head through the curtain, "I've got some work to do on the way home, Major. No cowboy antics." As the be-starred one disappeared in the back, a twitch of apprehension showed for an instant on Sammy's face.

"So this is what the weather people call 'wet' eh," General Lockjaw muttered to Blinky who sat across from him. "I hope Terror knows what he's doing." Although no one noticed, the same look of apprehension on Sammy's face moments before, now firmly entrenched itself across Blinky's.

Engine start was normal. Taxi instructions included the current runway RCR—again, "wet."

"As long as the weather folks are sticking to their guns, I see no reason why we should delay any longer, m'boy," chirped C. R.

"But boss, I can't even see the taxiway lights, let alone the taxi line." An obvious note of concern had crept into Sammy's usually stoic demeanor.

"All right, lad. If it will make you feel better, you can step outside before we taxi, and take an RCR reading of your own."

With that, Sammy extricated himself from the right seat and headed for the crew door. Once outside, he found himself more than ankle deep in snow. As he looked toward the cockpit, he spotted The Pompous Pontificator waving his arms in furious abandonment. He reentered the cockpit after knocking the snow off his shoes.

"We've got to get moving m'boy. Tower says they may have to close the runway in a bit for snow removal and if we're going, we have to go now."

The thrust from the mighty Learjet engines covered base ops with a virtual blizzard as The Ace of Aerospace nudged the C-21 from its parking spot.

"I can't see a thing," complained Sammy.

"Tut, tut, m'boy," urged C. R. "All we have to do is keep our tricycle in wide open spaces, and we'll be fine."

Taxi out was uneventful; however, a look in the rearview mirror (had the biz jet been so equiped) would have sent Sammy scurrying for an airsick bag. C. R.'s S-turns left wheel tracks resembled the trail made by a formation of inebriated boa constrictors. Takeoff clearance included a warning about the heavy snowfall, but still called the RCR "wet."

"Let's roll for home," piped C.R. as his pudgy prehensile digits slammed the throttles to the limits. The MAC biz jet jumped and bounced as if poked with a cattle prod as it careened down the runway, momentarily frequenting the centerline hidden beneath the white surface. Intestinal pain suddenly gripped C. R. and diverted most, if not all, his attention from the task at hand. Acute white knuckleitus filled C. R. with "terror" as he fixated on the blowing snow, and abandoned all semblance of an instrument takeoff. MAC's white rocket was headed for the boonies.

"Yeeooooww. . . " shrieked C. R., as the aircraft, crew, and pax bumpity bumped over numerous runway lights and departed the prepared surface.

"Reject!" shouted Sammy, the sound of another human voice startling C. R. back to reality. C. R. yanked back the throttles and brought the once sleek flying machine to a sliding halt. All crew and pax safely egressed the crippled bird, now in snow up to the wing tips.

"I'll see you in shackles for this, Terror," shouted General Lockjaw, over the sirens of approaching rescue vehicles.

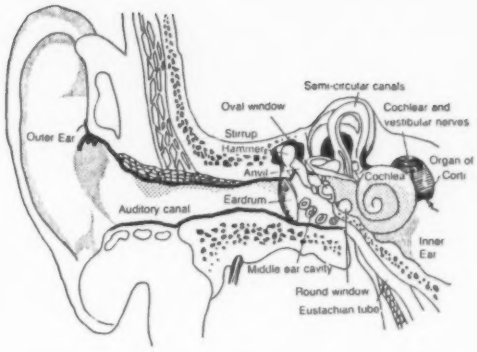
Sammy, Blinky, Max, and Ty could only shuffle their feet in the snow and wince as they witnessed yet another chewing out at their boss' expense.

The damage to the Lear was minimal. The damage to C. R.'s ego and posterior, as a result of the berating he received from Colonel Fang, was substantial. The deadhead home gave C. R. considerable time to ponder his fate, the "but the weather folks were calling the RCR wet" argument didn't hold a drop of water with the colonel. The terms "judgement, responsibility, common sense, incompetence, and nitwit" surfaced repeatedly in the one-sided conversation. Half-human eating habits were cussed and discussed at length.

C. R.'s fate and future once again hung in the balance as a result of his disregard for rules and regulations, and lack of sound judgement. From C. R. we expect it. From *you* we don't. ✈

SAY AGAIN . . . ?

(Editor's Comments: In TMF Feb 1989, we described, in general, the residual effects of alcohol—the degradation of performance which can still occur when the short-term influence of alcohol consumption has dissipated. In this issue, we'll address alcohol's effects on the ear, and the part the ear plays in maintaining the human body's balance and stabilization.)



Some of you may have noticed that after a heavy night's drinking you have, as they say, to wait for the bed to go past before you can jump onto it and that things get even worse when you lie down. This happens because of the relationship between vestibular (inner ear) stimulation and eye movements.

The semicircular inner ear canals are best regarded as angular accelerometers. Each one is a fluid-filled tube with a watertight swinging door across it. The fluid tries to stay still because of its inertia, and deflects the door one way or another depending on the direction of the head's angular acceleration, whether produced by voluntary head movement or by some external motion such as aircraft yaw, pitch, or roll. Head movements detected by this system are used to stabilize the visual world on the retina by the elicitation of eye movements, i.e., eye movements are made to compensate for head movements so that the world does not appear to fly about on the retina. You can experience this by nodding while reading this—you should still be able to read it. If, however, you wave this magazine up and down instead of nodding, then you cannot read it.

In order for this system to work, the watertight door must be unaffected by linear accelerations such as gravity and, to be so unaffected, the door must have the same specific gravity as the fluid. Alcohol in the system disturbs this special gravity balance. The flap tends to float and the deflection is interpreted as a head movement so a compensatory eye movement is made. However, as no real head movement was made, the eye movement is inappropriate and the subject perceives the world to move. This effect follows closely with the consumption of alcohol and is known as Positional Alcohol Nystagmus (Phase 1) or PAN 1. As the fluid and flap come into alcoholic imbalance, there then follows a phase when there is an absence of abnormal eye movements, and this is followed by a second phase of Positional Nystagmus. The further phase (PAN 2) is caused by an imbalance of specific gravity between the fluid and the door as the system loses alcohol. (Alcohol remains in this system well after the blood levels have become negligible.) With increased "g" forces, the imbalance is effectively amplified.

The upshot of all this is that the abnormal eye movements that are evidence of vestibular problems can be produced up to two days after drinking the equivalent of a couple of pints of beer, if the subject is exposed to two or three g's. This effect can be demonstrated long after alcohol can no longer be detected in the blood.

The precise significance, as far as flying is concerned, is difficult to determine—but it can safely be said that if you find yourself in an unusual attitude being subjected to unusual accelerations, then the effects discussed above may well lead you to become disoriented when you might otherwise not have been and, once disoriented, will make it more difficult for you to recover the situation.

For all its importance to a pilot, balance and stabilization are nevertheless secondary functions as far as the ear is concerned. Its primary contribution, hearing, is rarely fully understood by airmen and too often taken for granted. We examine why below.

In common with many others who saw action in a war, a significant proportion of pilots now suffer a degree of hearing loss.

It is thought bomber pilots, with their proportionally longer exposure to powerful and unsilenced multiple engines, have suffered more than most. Of course, it couldn't happen to you in your modern-day aircraft . . . or could it?

It's important to understand that sound is audible energy arising from wave motion. The eardrum converts this wave motion into mechanical motion which the tiny middle ear bones transmit to the inner ear. The inner ear then converts that motion into nerve impulses, via 30,000 or so highly sensitive hair cells in an area known as the Organ of Orti. Each individual cell responds to its own preprogrammed frequency.

When the hearing mechanism is subjected to overstress, these hair cells can gradually break down. Unlike some other cells in the human body, they do not regenerate, and damage is, therefore, permanent. This is known as Noise Induced Hearing Loss, or NIHL. Unfortunately, its insidious and gradual nature, and the fact it can occur as a result of cumulative exposure to levels of noise well below the pain threshold, means NIHL is often not identified or recognized.

This is compounded by individuals' general reluctance to believe they may be at risk, especially when they are 'used to the noise.' As it happens, when average daily exposure of individuals to noise reaches 85 dB(A), hearing protection must be worn. The significant thing is the sound level generated by light tractors, for instance, has been measured inside the cab at over 95 dB(A). Few figures are available for light aircraft, but it's a fair bet that even a 1960's or '70's single engine aircraft, let alone another type, is a lot noisier than a 1980's tractor.

As already noted, sound comes in more than one frequency. This is probably not the place for an in-depth study of the effects of differing frequencies, except to note that it is often not the offending frequency that actually damages the ear—another reason why exposure to damaging noise levels can go unnoticed. Low frequencies, such as those emitted by helicopter gearboxes, are particularly damaging.

You might think noise regulations apply only in the workplace; not to you in the aircraft. Of course, for many a pilot, an aircraft is often his or her workplace. Just because the regulation does not extend to the individual in the privacy of his own surroundings doesn't absolve him from the effects of his own actions.

Interestingly, some research has shown that intermittent exposure to noise is not much less harmful than continuous exposure. Furthermore, psychological as well as physiological effects result from exposure to excess noise. Tiredness is the most obvious, but raised blood pressure, alterations in sleep patterns, and lengthening of reaction time are also measurable. So it really does make sense to wear some sort of hearing protection when flying.

Okay, you already chose to wear a headset. This is just as well, since 90 percent of sound reaches the inner ear through the bone behind the ear, rather than through the auditory canal itself. But it is not the end of the story. All headsets are not the same. For a start, some types aren't designed for suppression of external noise at all, but merely for placing a speaker conveniently close to your ear. Think for a moment, and you will note that these can actually exacerbate the noise problem. Take the analogy of your car radio. How often have you had to turn down the volume when coming to a halt after travelling at 70 mph on a highway. It didn't sound loud before, because the background noise tended to block it out. But boy, was it loud when you weren't moving.

So it is with headsets. The radio volume you are feeding into your ears could be damaging on its own, leaving you just as deafened as the man on the subway with the Walkman turned up so loud you can hear every drumbeat on his Springsteen LP. Add a significant external noise source and the risk increases.

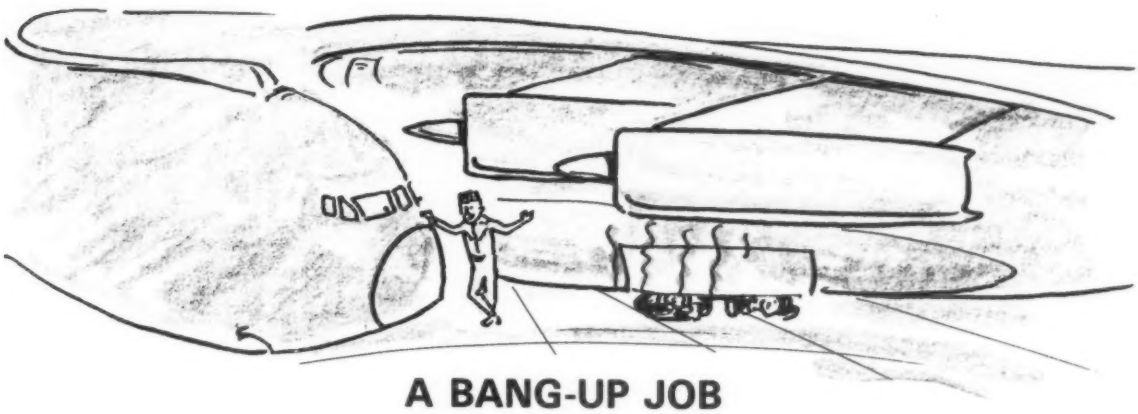
The noise suppression features to look for in a headset are rigid cups on the outside, and detachable soft foam cushions on the inside. Even the liquid-filled rings experimented with on the Voyager round-the-world flight are now available commercially on some models. Worn and generally floppy cloth rings just will not do. If you are contemplating making do with a borrowed set of phones, it may interest you to know you're susceptible to pick up 130 communicable diseases.

Also, try to make sure the impedance of your phones matches that required of your radios, and that your COMM set actually functions as it was designed. That way, you won't need to have the volume up loud enough to overcome the static, allowing you to hear what on earth ATC just said.

Why not take a look at your headset? If you operate a noisy aircraft (and realistically, that doesn't exclude many), and your headset isn't up to scratch, replace it. Your ears will thank you for it, and remember, you heard it it here first. Or did you? Say again?

Adapted From
Flight Safety Bulletin, Winter 89/90

QUICKSTOPPERS



A BANG-UP JOB

The C-141 touched down, shuddered, and leaned to the left. Passengers first heard one, then two loud bangs. Believing a tire had blown, the crew stopped the aircraft on the runway to allow the scanner to visually confirm it. The scanner reported Number 2, 5, and 6 main gear tires blown and structural damage to the wheel well. Both pilots described the landing as smooth, and the engineer confirmed the brake release light was on prior to touchdown.

Maintenance folks were unable to duplicate the malfunction. The antiskid control box and antiskid control valves were sent for MDR. Again, failure of the valves and box could not be duplicated or identified with in-shop testing. However, the control box MDR suggested the possibility that the antiskid on/off switch was defective or had a high resistance. This could cause loss of touchdown protection.

All tires have survived nicely since the replacement of the switch.

WHEN IT RAINS . . . .

The radome of a C-130 was struck by lightning as the aircraft was being vectored for an ILS approach. Flight deck crewmembers observed a flash and a loud report. The loadmaster observed a static discharge move from the front of the cargo compartment to the rear which appeared to flash in the area of the ramp. The radar became inoperative, but no other problems were immediately noted. The approach was discontinued and the crew diverted to home station. On descent, Number 2 throttle could not be moved. The Number 2 engine was shut down, an emergency declared, and the aircraft continued to an uneventful visual approach and landing. A maintenance inspection found that the cause of the throttle binding was not related to the lightning strike. Some days it doesn't pay to get out of bed.

QUICKSTOPPERS

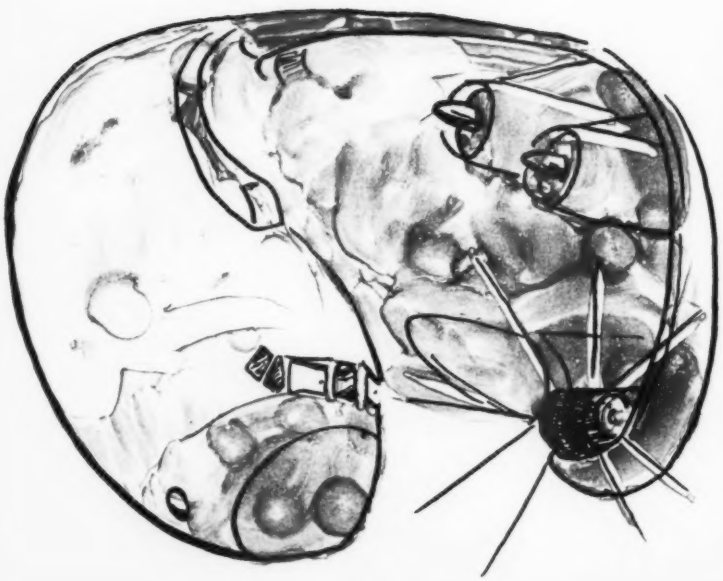
DOWN AND LOCKED? NOT QUITE

Upon mission termination, the crew of a C-130 was unable to get a down and locked indication on the nose landing gear. After a missed approach, and a tower check of the nose gear, the aircraft was vectored for troubleshooting.

The crew verified the unsafe condition by observing the nose landing gear from under the flight deck. Attempts to lower the nose gear with emergency hydraulic extension, free fall, and tiedown strap pressure were unsuccessful.

The crew reviewed Dash One procedures for landing with an unsafe nose gear, made an uneventful landing, and stopped on the runway to allow maintenance to jack and pin the gear before towing. Investigation revealed moisture had entered the drag strut actuating cylinder assembly along the area between the rod and actuator. This moisture caused internal corrosion which disrupted the flow of hydraulic fluid in the cylinder and prevented full extension of the nose landing gear. It seems even Herks can get arteriosclerosis.

"OH, MY ACHING FOOT . . . ."



During takeoff roll, one of the three vehicles in the C-141 cargo compartment rolled back, right over a "lucky" Marine's left foot. "Lucky" since the vehicle caused only minor injury.

Investigation revealed a Marine load team helped load three vehicles onto the aircraft. The loadmaster supervised the first vehicle's tiedown. While his attention was diverted with loading the palletized cargo, completing forms, and loading the troops, the Marine load team completed the tiedown of the remaining two vehicles. The loadmaster visually checked all three tiedowns. Because of a seating problem, the loadmaster sat on the flight deck during takeoff. After being advised of the "roll-back" incident, the crew coordinated for an ambulance and returned to their starting point. In the meantime, the loadmaster managed to move the vehicle off the passenger's foot and apply additional restraint to the wandering vehicle. After an uneventful landing, our Marine was checked by medical personnel and returned to his duty station.

It'll take a lot more than that to keep a Marine down.

After Deadlines

ONE MORE WELL-DESERVED RECOGNITION--Mr. Tommy O'Laughlin, *TMF* Art Director, receives yet one more kudo from Col. John R.Wingfield, III, 375th Air Base Group Commander, Scott AFB, Illinois--A "FIRST PLACE" plaque. Tommy earned this latest recognition in the 1989 AAVS-sponsored FREE LANCE category. Well done Tommy! *TMF* would not be the same without you!

TANKER TRANSPORT TRAINING SYSTEM (TTTS)--The Air Force awarded McDonnell-Douglas Corporation the initial phase of TTTS. Work will be performed by Douglas Aircraft Division, Long Beach, Calif., as well as by Beech Aircraft Corp, Wichita, Kan.; and Quinton Corp. in Chantilly, Va. Beech Aircraft will deliver the Beechjet 400T, a military derivative of their commercial Beechjet 400A. The one-year contract is for production of the first aircraft with options for a total of 211. TTTS will be used by Air Training Command in specialized training of undergraduate pilots who will later fly tankers or transport aircraft. Delivery of the first TTTS is scheduled to take place by October 1991.

Beechcraft 400T

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SAFETY was the theme and primary discussion topic at the Twenty-Second Air Force (22 AF) Commanders Conference, Hickam AFB, Hawaii, 30 Jan—1 Feb 1990. Maj. Gen. Richard J. Trzaskoma, Commander, 22 AF, challenged his commanders, staff officers, and guests to think "safety" throughout the conference and take home ideas to make their units safer and more effective.

Front Row Left to Right: Brig. Gen. James M. Johnston, III, USAF Director of Aerospace Safety; Maj. Gen. Leonard W. Hegland (AFRES) Reserve Advisor to 22 AF/CC; Maj. Gen. Richard J. Trzaskoma; Maj. Gen. James C. Wahleithner, Commander, 4th Air Force (AFRES); and Brig. Gen. James F. Hinkle, Commander, 834th Airlift Division. Assembled behind the general officers are Commanders of 22 AF active and associate wings, hospitals, MASS's, key 22 AF staff, and guest speakers from HQ MAC.